

# RS-232C communication specifications for IK-HD1C

## 1. Communication data specifications

Synchronization system	Asynchronous
Baud rate	9600 bps / 19200 bps
Data length	8 bits
Parity	None
Start bit	1 bit
Stop bit	1 bit
Direction of transmission	LSB first
Handshake function	None

## 2. Terminal names ( camera side )

Name	Direction of signal
TXD	Camera to PC
RXD	PC to camera
GND	-
GND	-

## 3. Method of connection

Camera		PC (RS-232C)
TXD	_____	RXD
RXD	_____	TXD
GND	_____	GND

## 4.Communication procedure

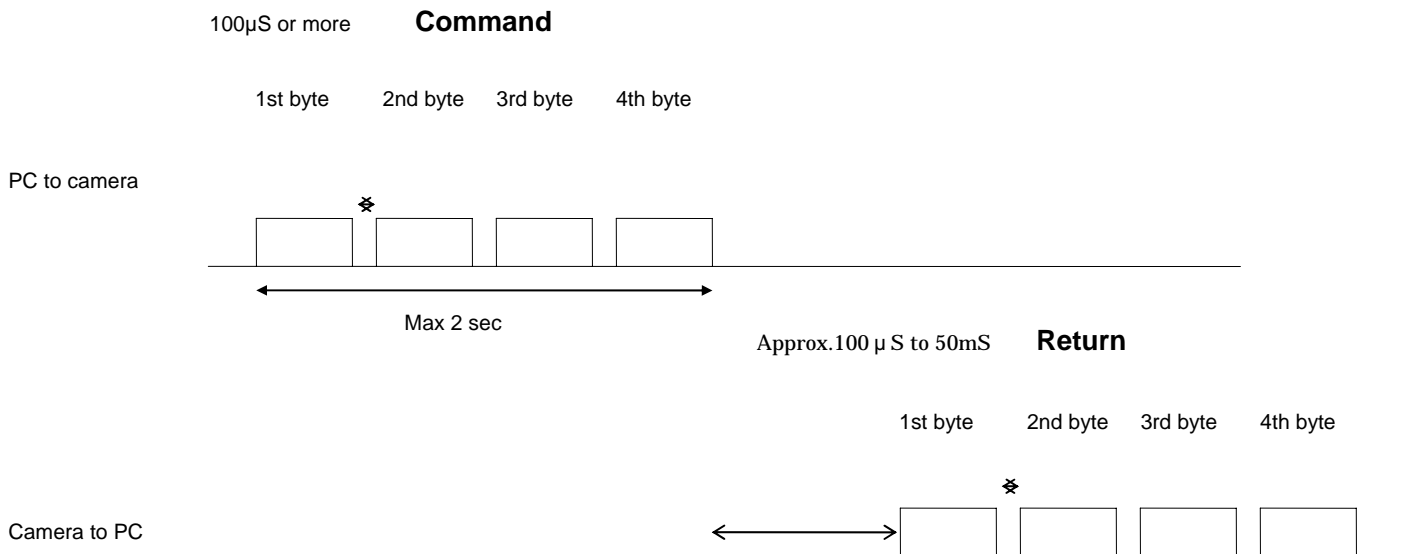
4-1. Camera communications consist of receiving a four-byte command code from the PC and then communicating a four-byte return code from the camera.

\* Transmitting any of the following commands before a return code transmission will cause that command to be ignored (unidentified)..

4-2. If the product fails to receive up to the 4th byte of data within about two seconds after receiving the 1st byte of command code from the PC, the product will judge the status as a communication error about the reception, and transmit a return code (15 01 FF FF).

\* The same is true in the case of an overrun error or framing error. About two seconds after such an error occurs, the product will transmit a return code (15 01 FF FF).

4-3. Do not transmit a next command from the time you transmit a command code to the camera until you finish receiving a return code. Allow for at least 50mS from the time you receive a return code until you transmit a next command.



## 5. Command code (PC to camera)

Item	Transmitted data				Actions	
	1st byte	2nd byte	3rd Byte	4th byte		
SWITCH	4BH	01H	FFH	FFH	DISP	Functions in the same way as the front switches.
	4BH	02H	FFH	FFH	PAGE	Note 1: The same as when the DATA UP is pressed for one second.
	4BH	03H	FFH	FFH	MENU UP	Note 2: The same as when the DATA DOWN is pressed for one second.
	4BH	04H	FFH	FFH	MENU DOWN	Note 3: The same as when the MENU UP is pressed for one second.
	4BH	05H	FFH	FFH	DATA UP	Note 4: Remote presetting does not change the baud rate setting. All other items function in the same way as the presetting actions made by pressing the MENU DOWN and DATA DOWN simultaneously. This returns the product to its initial settings.
	4BH	06H	FFH	FFH	DATA DOWN	
	4BH	07H	FFH	FFH	AWB START(Note 1)	
	4BH	08H	FFH	FFH	ABB START(Note 2)	
	4BH	09H	FFH	FFH	ASHD START(Note 3)	
	4BH	0AH	FFH	FFH	DATA PRESET(Note 4)	
	4BH	0BH	FFH	FFH	FILE	
	4BH	0DH	FFH	FFH	KEY LOCK ON	Functions in the same way as the KEY LOCK switch on the rear panel.
	4BH	0EH	FFH	FFH	KEY LOCK OFF	
	4BH	11 H	FFH	FFH	GAIN	Functions in the same way as the front switches.
MEMORY	05H	ADDRESS	FFH	FFH	MEMORY DATA READ REQUEST For ADDRESS, see 11."ADDRESS&DATA (1st byte=05H, 53H)."	
	53H	ADDRESS	DATA(L)	DATA(H)	MEMORY DATA WRITE REQUEST For ADDRESS and DATA, see 11."ADDRESS&DATA (1st byte=05H, 53H)."	
	FFH	ADDRESS	FFH	FFH	CAMERA STATUS READ REQUEST For ADDRESS, see 13."ADDRESS&DATA (1st byte=FFH)."	

- The tables in 10 and 11 (on page 7 and later) notate the data H first, then L. You should however transmit the data L first, then H.

## 5-1. Operating KEY LOCK

If you transmit the KEY LOCK command (4B 0D FF FF or 4B 0E FF FF), you can not operate by KEY LOCK switch on the rear panel until the following actions are performed.

- Disconnect a cable of RS-232C.
- Turn off the computer.
- After turning off the camera, turn it on again.

## 5-2. MEMORY DATA READ / WRITE

### 1) MEMORY DATA READ REQUEST (05 ADDRESS FF FF)

- This function is used to read items that can be configured by OSD (two-byte data).
- For the contents of ADDRESS and DATA, see 11. "ADDRESS&DATA(1 st byte=05H,53H)."
- This function reads the contents of the specified item.

### 2) MEMORY DATA WRITE REQUEST (53 ADDRESS DATA(L) DATA(H))

- This function is used to rewrite the contents of items that can be configured by OSD (two-byte data).
- For the contents of ADDRESS and DATA, see 11. "ADDRESS&DATA(1 st byte =05H,53H)."
- This function rewrites the contents of the specified item.
- During AWB (while the data in AUTO READ is 01H), the product will not accept the MEMORY DATA WRITE REQUEST command. (The product will return the return code due to the camera mode error. See 6. "Return code.")

### 3) MEMORY DATA READ REQUEST (FF ADDRESS FF FF)

- This function is used to read the status data of the camera (two-byte data).
- For the contents of ADDRESS and DATA, see the contents of 12. "ADDRESS & DATA (1st byte = FFH)."

## 6 . Return code (Camera to PC)

Item	Return code				Meaning
	1st byte	2nd byte	3rd byte	4th byte	
NORMAL	06H	Transmitted data 2nd byte	Transmitted data 3rd byte	Transmitted data 4th byte	Transmitted data, 1st byte 05H , FFH
	06H	ADDRESS	DATA(L)	DATA(H)	Transmitted data, 1st byte = 05H
	FFH	ADDRESS	DATA(L)	FFH	Transmitted data 1st byte = FFH
ERROR	15H	01H	FFH	FFH	Invalid data (1st,2nd byte)
	15H	02H	FFH	FFH	Invalid data (3rd,4th byte)
	15H	03H	FFH	FFH	Camera mode error You have specified a command which cannot be executed in the current camera mode or which cannot produce anything significant.
	15H	04H	FFH	FFH	A communication error has occurred (an overrun error or framing error).
	15H	05H	FFH	FFH	Time-out

A camera mode error (15H 03H FFH FFH) can be caused by any of the following:

Command category	Command item	Camera status that causes a mode error
Operation switch system	DISP	- AWB, ABB, ASHD being executed.
	PAGE	- AWB, ABB, ASHD being executed.
	MENU UP	- Color bar screen on - Camera screen on - AWB, ABB, ASHD being executed.
	MENU DOWN	ditto
	DATA UP	- Color bar screen on - Camera screen on - AWB, ABB, ASHD being executed.
	DATA DOWN	ditto
	FILE	- Color bar screen on - AWB, ABB, ASHD being executed.
	AWB START	- The WB mode is in a mode other than AWB. - Color bar screen on - Menu screen on - AWB, ABB, ASHD being executed.
	ABB START	- Color bar screen on - Camera screen on - AWB, ABB, ASHD being executed.
	ASHD START	-SHADING mode is in a mode other than SET. - Color bar screen on - Menu screen on - AWB, ABB, ASHD being executed.
DATA PRESET	- Color bar screen on - Menu screen on - AWB, ABB, ASHD being executed.	
MEMORY DATA WRITE	Other than SCENE FILE	- AWB, ABB, ASHD being executed.
MEMORY DATA WRITE	SCENE FILE	- Color bar screen on - AWB, ABB, ASHD being executed.

## 7. AWB

- 1) To start AWB, take an image of a white subject and transmit an AWB SART command under the following conditions:

The WB mode should be AWB.

The camera screen (a live image) should be on. (The OSD PAGE data should be 00H.)

AWB , ABB , SHD should not be under execution. (AUTO READ data should not be 01H , 0BH , 0FH)

- 2) For the AWB status (whether in progress or complete) and the final result, read the contents of AUTO READ by using the MEMORY DATA READ REQUEST(FF 03 FF FF) command. For the causes of errors, refer to the following:

NG : AWB will not be completed within a specified time.

CTEMP HIGH : Color temperature is too high.

CTEMP LOW : Color temperature is too low.

LEVEL HIGH : The level of the image in the area is too high.

LEVEL LOW : The level of the image in the area is too low.

NOT AVAILABLE : AWB START command has been transmitted when the conditions specified in 1) are unmet.

## 8. ABB

- 1) To start ABB, transmit an ABB START command under the following conditions:

The camera screen (a live image) should be on. (The OSD PAGE data should be 00H.)

AWB , ABB , SHD should not be under execution. (AUTO READ data should not be 01H , 0BH , 0FH.)

- 2) For the ABB status (whether in progress or complete) and the final result, read the contents of AUTO READ by using the ABB MEMORY DATA READ REQUEST(FF 03 FF FF) command. For the cause of errors, refer to the following:

NG : ABB will not be completed within a specified time.

CLOSE LENS : The lens iris is open. Close the lens iris.

## 9 . ASHD (AUTO SHADING)

1) To start AUTO SHADING, transmit an ASHD START command under the following conditions:

SHADING setting of OPTION should be SET.( OPTION SHADING MODE data should be 00H.)

The camera screen (a live image) should be on. ( OSD PAGE data should be 00H.)

AWB , ABB , SHD should not be under execution. ( AUTO READ data should not be 01H , 0BH , 0FH.)

2) For the SHD status (whether in progress or complete) and the final result, read the contents of AUTO

READ by using the MEMORY DATA READ REQUEST (FF 03 FF FF) command. For the causes of errors, refer to the following:

SHD LIMIT : Automatic shading correction operation finished, however, the correction necessary exceeds the camera's range so the maximum possible value is applied.

LEVEL HIGH : The level of the image in the area is too high.

LEVEL LOW : The level of the image in the area is too low.

SHD NG : AUTO SHADING will not be completed within a specified number of times.

NOT AVAILABLE : ASHD START command has been transmitted when the conditions specified in 1) are unmet.

## 10 . Other

The product will store the data even if the data changes made in MEMORY DATA WRITE REQUEST (53 ADDRESS DATA(L) DATA(H)) is not enabled in the camera mode at the time of the change. The next time the product switches to the mode in which the data is enabled, the data will be reflected on the camera status.

Example: Setting MANUAL SHUTTER to 1/10000S, setting when the SHUTTER MODE is AUTO.

=> The product will only switch to 1/10000S when the SHUTTER MODE switches to MANUAL.

11 . ADDRESS & DATA (1st byte = 05H , 53H)

\* : don t care

Item		Address	Data		Action	
			H	L		
SHUTTER	MODE	01H	* * H	00H	AUTO	Sets the SHUTTER MODE and EXT TRIG mode. AUTO : Auto shutter MANU : Manual mode SS : Synchronous scan mode
				01H	MANU	
				02H	SS	
	LEVEL	03H	* * H	9CH	-100	Adjusts the automatic shutter level. Level Low  If the high level is selected, the value increases. If the low level is selected, the value decreases.  Level High
				00H	00	
				64H	100	
	PEAK/AVE	04H	* * H	00H	00:10	Adjusts the ratio between peak and average value in the automatic shutter mode. 00: Average only (01 to 09) : The bigger the value is, the higher the ratio is. 10: Peak only
				0AH	10:00	
	SPEED	05H	* * H	00H	1	Adjusts the automatic shutter response speed. The bigger the value is, the faster the response is.
				13H	20	
	AREA	06H	* * H	00H	PRESET A	Selects the available picture area in the automatic shutter mode.. PRESET A,B,C,D,E: Specified range USER: User setting area (Setting area is available)
				01H	PRESET B	
				02H	PRESET C	
03H				PRESET D		
04H				PRESET E		
MANUAL	0DH	* * H	00H	OFF	Sets a shutter speed in manual mode.	
			01H	1/100S		
			02H	1/125S		
			03H	1/250S		
			04H	1/500S		
			05H	1/1000S		
			06H	1/3000S		
			07H	1/5000S		
			08H	1/10000S		
			09H	1/30000S		
			0AH	1/50000S		
SYNCHRO SCAN	0EH	0001H	001 / 1125H	Sets a shutter time every time a synchronization scan is turned off or every hour of data setting. 001H/1125H ~ 560/1125H: The shutter speed can be set by the 1H. (1H) (560H)		
		0230H	560 / 1125H			



			0231H	OFF	Shutter speed 1/60
--	--	--	-------	-----	--------------------

Item		Address	Data		Action	
			H	L		
GAIN	MODE	20H	* * H	00H	AUTO	Sets the master gain mode.
				01H	MANUAL	
				02H	OFF	
	AUTO MAX	21H	* * H	00H	00dB	Sets the maximum gain when the master gain is AUTO mode.
				12H	18dB	
	MANU	22H	* * H	00H	00dB	Sets the gain when the master gain is manual.
12H				18dB		
WHITE BALANCE	MODE	30H	* * H	00H	AWB	Sets the white balance mode.
				01H	ATW	
				02H	MANUAL	
	C.TEMP	31H	* * H	00H	3200K	Sets a color temperature.
				01H	5600K	
	R PAINT	32H	* * H	F6H	-10	Sets the RED setting in AWB mode.
				00H	00	
				0AH	10	
	B PAINT	33H	* * H	F6H	-10	Sets the BLUE setting in AWB mode.
				00H	00	
				0AH	10	
	AREA	34H	* * H	00H	PRESET A	Sets in AWB mode. PRESET A,B,C,D,E : in the specified range
01H				PRESET B		
02H				PRESET C		
03H				PRESET D		
04H				PRESET E		

Item		Address	Data		Action	
			H	L		
WHITE BALANCE	R GAIN	39H	FF9CH		-100	Sets the RED gain in MANUAL mode.
			0000H		0	
			0064H		100	
	B GAIN	3AH	FF9CH		-100	Sets the BLUE gain in MANUAL mode.
			0000H		0	
			0064H		100	
	ATW R PAINT	3BH	* * H	F6H	-10	Sets the RED setting in ATW mode.
			00H	0		
			0AH	10		
ATW B PAINT	3CH	* * H	F6H	-10	Sets the BLUE setting in ATW mode.	
			00H	0		
			0AH	10		
AWB R DATA READ	A0H	* * H	* * H	Data read	201 ~ 2838	Reads R data in Auto White Balance. Note) This item can only read 1st byte=05H. It can not be written 1st byte=53.
AWB B DATA READ	A1H	* * H	* * H	Data read		
					201 ~ 2838	Reads B data in Auto White Balance. Note) This item can only read 1st byte=05H. It can not be written 1st byte=53H.

Item		Address	Data		Action	
			H	L		
PROCESS	GAMMA ON/OFF	40H	* *H	00H	ON	Gamma correction setting : ON/OFF
				01H	OFF	
	GAMMA	41H	* *H	66H	-10	Gamma correction level setting
				00H	0	
				0AH	10	
	DTL GAIN	44H	* *H	69H	-7	DTL gain setting
				00H	0	
				07H	7	
	M. PED	46H	* *H	9CH	-100	Master pedestal setting
				00H	0	
				64H	100	
	DNR	48H	* *H	00H	OFF	Digital noise reduction setting : ON/OFF
01H				ON		

Item		Address	Data		Action	
			H	L		
MATRIX	MATRIX ON/OFF	50H	* * H	00H	ON	Matrix color correction : ON/OFF
				01H	OFF	
	R HUE	51H	* * H	F1H	-15	Red hue setting
				00H	0	
				0FH	15	
	R GAIN	52H	* * H	F1H	-15	Red gain setting
				00H	0	
				0FH	15	
G HUE	53H	* * H	F1H	-15	Green hue setting	
			00H	0		
			0FH	15		
G GAIN	54H	* * H	F1H	-15	Green gain setting	
			00H	0		
			0FH	15		
B HUE	55H	* * H	F1H	-15	Blue hue setting	
			00H	0		
			0FH	15		
B GAIN	56H	* * H	F1H	-15	Blue gain setting	
			00H	0		
			0FH	15		

Item		Address	Data		Action	
			H	L		
MATRIX	Ye HUE	57H	* * H	F1H	-15	Yellow hue setting
				00H	0	
				0FH	15	
	Ye GAIN	58H	* * H	F1H	-15	Yellow gain setting
				00H	0	
				0FH	15	
	Cy HUE	59H	* * H	F1H	-15	Cyan hue setting
00H				0		
0FH				15		
Cy GAIN	5AH	* * H	F1H	-15	Cyan gain setting	
			00H	0		
			0FH	15		
Mg HUE	5BH	* * H	F1H	-15	Magenta hue setting	
			00H	0		
			0FH	15		
Mg GAIN	5CH	* * H	F1H	-15	Magenta gain setting	
			00H	0		
			0FH	15		

Item		ADDRESS	DATA		Action	
			H	L		
SYNC	H PHASE	70H	FC00H		-1024	Adjusts H phase with external sync signal.
			0000H		0	
			03FFH		1023	
OPTION	OUTPUT	80H	* * H	00H	RGB	Changes output mode.
				01H	Y/PR/PB	
	SHADING (MODE)	84H	* * H	00H	SET	Sets shading correction mode.
				01H	MANU	
				02H	OFF	
	MANU SHADING	85H	* * H	80H	-128	Sets a correction value for cases when the shading correction mode is MANUAL.
				00H	0	
				7FH	127	
	RGB SYNC	86H	* * H	00H	G	Only G signal output setting with SYNC.
				01H	ALL ON	All RGB output setting with SYNC.
				02H	ALL OFF	All RGB output setting without SYNC.
	BAUD RATE	88H	* * H	00H	9600bps	Sets a baud rate for RS232C communications.
				01H	19200bps	
	OSD	89H	* * H	00H	ALL ON	All output setting with OSD.
				01H	Analog	Only analog output setting with OSD.
02H				Digital	Only digital output setting with OSD.	

Item	Address	Data		Action	
		H	L		
SCENE FILE	90H	* * H	00H	FILE A	Selects a scene file.
			01H	FILE B	
			02H	FILE C	
			03H	FILE D	
			04H	FILE E	



## 12 . ADDRESS & DATA (1st byte = FFH)

Item	Address	Data		Action	
		H	L		
GAIN READ	01H	FFH	00H	00dB	Master gain
			12H	18dB	
KEY LOCK READ	02H	FFH	00H	KEY LOCK ON	Key lock mode. (It may differ from the switch position by the remote settings.)
			01H	KEY LOCK OFF	
AUTO READ	03H	FFH	01H	AWB in progress.	
			02H	The final result of AWB is accepted.	
			03H	The final result of AWB is rejected. C . TEMP HIGH(R GAIN MAX)	
			04H	The final result of AWB is rejected. C . TEMP HIGH(B GAIN MIN)	
			05H	The final result of AWB is rejected. C . TEMP LOW(R GAIN MIN)	
			06H	The final result of AWB is rejected. C . TEMP LOW(B GAIN MAX)	
			07H	The final result of AWB is rejected. LEVEL HIGH	
			08H	The final result of AWB is rejected. LEVEL LOW	
			09H	The final result of AWB is rejected. NOT AVAILABLE	
			0AH	The final result of AWB is rejected.	
			0BH	ABB in progress.	
			0CH	The final result of ABB is accepted.	
			0DH	The final result of ABB is rejected.	
			0EH	The final result of ABB is rejected. LENS OPEN	
			0FH	AUTO SHADING in progress.	
			10H	The final result of AUTO SHADING is accepted.	
11H	The final result of AUTO SHADING is rejected.				
12H	The final result of AUTO SHADING is accepted. LIMIT				
13H	The final result of AUTO SHADING is rejected. LEVEL HIGH				
14H	The final result of AUTO SHADING is rejected. LEVEL LOW				
15H	The final result of AUTO SHADING is rejected. NOT AVAILABLE				

Item	Address	Data		Action	
		H	L		
OSD PAGE	04H	FFH	00H	OSD OFF(a live image)	
			01H	INDEX	
			02H	SHUTTER	
			03H	GAIN	
			04H	WHITE BALANCE	
			05H	PROCESS	
			06H	MATRIX	
			07H	SYNC	
			08H	OPTION	
			FFH	COLOR BAR	
" POINT	05H	FFH	00H	1st ITEM to 13th ITEM	The position of " " for the each MENU. (1st to 13th from the top.)
			0CH		